1. A method of producing a steel starter head shaft that comprises successively at least one first front guidance length sliding axially on a starter head, a second fluted intermediate length comprising external flutes able to cooperate with complementary internal flutes on the starter head, and a third rear length comprising at least one annular shoulder transverse face oriented towards the front, which constitutes a rear stop face for determining a determined axial position of the starter head, the method comprising at least the following successive steps:

a) machining the three first, second and third lengths;

b) producing the external flutes of the second intermediate length;

c) surface heat treatment of at least an axial part of the starter head shaft;

characterized in that the method includes an additional step, prior to the heat treatment step, of reducing the residual mechanical stresses resulting from the steps prior to the heat treatment.

2. The method according to claim 1, characterized in that the said additional step is a step of annealing at least an axial portion of the starter head shaft.

3. The method according to claim 2, characterized in that the additional step of annealing at least an axial portion of the starter head shaft is an operation of surface heating by induction along the said axial portion.

4. The method according to claim 3, characterized in that the additional step of annealing by surface heating by induction comprises a heating period during which the inductor is axially static with respect to the said portion of the starter head shaft.

5. The method according to claim 4, characterized in that the static heating period is between 0.5 seconds and 15 seconds.

6. The method according to claim 4, characterized in that the axial length of the inductor is substantially equal to the axial length of the said portion of the starter head shaft.

7. The method according to claim 3, characterized in that the axial length of the inductor is less than the axial length of the said portion of the starter head shaft, and the inductor is driven in axial translation with respect to the starter head shaft.

8. The method according to claim 7, characterized in that the relative axial translation speed of the inductor with respect to the starter head shaft is between 100 mm/minute and 700 mm/minute.

9. The method according to claim 3, characterized in that the induction heating power is less than 10 kW.

10. The method according to claim 3, characterized in that the starter head shaft is driven in rotation with respect to the inductor at a rotation speed of less than 200 rev/min.

11. The method according to claim 6, characterized in that the internal profile of the inductor is complementary to the external profile of the said starter head shaft portion.

12. The method according to claim 2, characterized in that said additional step of annealing at least an axial portion of the starter head shaft is an operation of heating the starter head shaft in a furnace.

13. The method according to claim 12, characterized in that the heating temperature is between 500°C and 700°C.

14. The method according to claim 12, characterized in that the duration of the operation of heating the starter head shaft is between 30 minutes and 120 minutes.

15. The method according to claim 12, characterized in that the operation of heating the starter head shaft in a furnace is an operation of heating at a constant temperature.

16. The method according to claim 12, characterized in that the operation of heating the starter head shaft in a furnace is followed by an operation of slow cooling to ambient temperature.

17. The method according to claim 1, characterized in that the said step of surface heat treatment of at least an axial part of the starter head shaft is a step of surface hardening by induction.

18. The method according to claim 17 taken in combination with claim 3, characterized in that the said additional steps of surface heating by induction and surface hardening by induction are carried out successively with the same induction heating means.

19. The method according to claim 1, characterized in that the method comprises a step, subsequent to the surface heat treatment step, of mechanical straightening of at least an axial part of the starter head shaft.

20. The method according to claim 1, characterized in that the method comprises a step of planing certain portions of the surface of the starter head shaft that is subsequent to the step of surface heat treatment of at least an axial part of the starter head shaft.

21. The method according to claim 1, characterized in that the said annular shoulder transverse face oriented towards the front of the third rear portion of the starter head shaft belongs to an internal radial groove that receives a rear elastic stop ring for determining the said determined axial position of the starter head.

22. The method according to claim 1, characterized in that the starter head shaft is extended axially beyond the said third rear length in order to constitute the shaft of the rotor of the electric motor of the starter.

23. The method according to claim 22, characterized in that the rotor shaft comprises a knurled length produced by cold deformation, and in that the said additional step for reducing the residual mechanical stresses is subsequent to the step of production of the knurled length of the rotor shaft by cold deformation.